REMARKS

Claim 35 is amended. Claims 49-74 are cancelled. Claims 35-48 are pending in the application.

Each of claims 35-74 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Besser, U.S. Patent No. 5,582,881; Shan, U.S. Patent No. 6,140,228; Colgan, U.S. Patent No. 5,925,933 and Marieb, U.S. Patent No. 5,909,635. Without admission as to the propriety of the Examiner's rejection, claims 49-74 are cancelled. With respect to claims 35-48, the Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Pending claims 35-48 are allowable over the cited combinations of Besser, Shan, Colgan and Marieb for at least the reasons that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims, and fail to provide motivation for combination or modification.

Independent claim 35 is amended to provide an improved claim format and clarification. The amendment to claim 35 is not intended to limit the scope of the claim. Claim 35 recites depositing a first layer comprising elemental aluminum or an aluminum alloy over a substrate where at least an outermost portion of a layer is deposited at a temperature of at least 400°C. Claim 35 further recites depositing at least one of elemental titanium or a titanium alloy on the first layer without letting the outermost portion of the first layer cool from the first deposition to a temperature below 360°C. Claim 35 additionally recites that essentially all of the titanium deposited alloys with the aluminum of the first

layer during the depositing of the titanium. As indicated in applicant's specification at, for example, page 2, line 13 through page 3, line 14, prior art processing utilizing conventional deposition methods typically involves moving a wafer to another chamber after deposition of aluminum prior to deposition of a titanium nitride comprising layer. However, these processing methods can result in defect areas due to migration of aluminum through cracks in the titanium nitride comprising layer. A prior art solution to the migration problem was to perform a cooling step prior to titanium nitride deposition adding a considerable amount of time to wafer processing. As indicated in applicant's specification the recited methods allow reduction or elimination of defects without significantly increasing the processing time.

As noted by applicant in previous responses and as noted by the Examiner at page 3 of the present action, Besser does not disclose or suggest the claim 35 recited forming the outermost portion of an aluminum layer at a temperature of at least 400°C or the recited deposition of titanium without letting the outermost portion of the layer cool below 360°C. As indicated by applicant in response to previous Actions, not one of Marieb, Colgan or Shan disclose or suggest the claim 35 recited deposition of titanium on the first layer without letting an outermost portion of the first layer cool. Further, not one of the four recited references disclose or suggest the claim 35 recited forming an alloy of titanium and aluminum during the deposition of titanium wherein essentially all of the deposited titanium alloys with the aluminum of the first layer during the depositing. Additionally, not one of the four cited references addresses the problem overcome by the claim 35 recited method. Accordingly, motivation for the claim 35 recited method is not provided by the combination of references recited by the Examiner. Nor does the cited combination suggest the claim

35 recited deposition of a first layer where at least an outermost portion of the first layer is deposited at a temperature of at least 400°C and without letting the outermost portion of the first layer cool to below 360°C depositing titanium over the first layer where essentially all of the deposited titanium alloys with the aluminum of the first layer during the deposition of titanium. Independent claim 35 is therefore not rendered obvious by the cited combination of Besser, Marieb, Colgan and Shan and is allowable over these references.

Dependent claims 36-48 are allowable over the cited combination of Besser, Colgan, Shan and Marieb for at least the reason that they depend from allowable base claim 35.

For the reasons discussed above claims 35-48 are allowable. Accordingly, applicant respectfully requests formal allowance of claims 35-48 in the Examiner's next action.

Respectfully submitted,

Dated: March 24, 2003

By: Jennifer J. Taylor
Jennifer J. Taylor, Ph.D.
Reg. No. 48,711

Application Serial No. 09/785,858
Filing Date ..... February 16, 2001
Inventor ..... Shane P. Leiphart
Assignee ..... Micron Technology, Inc.
Group Art Unit 1745
Examiner ..... Cantelmo, Gregg
Attorney's Docket No. MI22-1636
Title: Method of Forming an Aluminum Comprising Line Having a Titanium Nitride Comprising Layer Thereon

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING RESPONSE TO DECEMBER 23, 2002 FINAL OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

35. (Amended) A method of forming an aluminum comprising line having a titanium nitride comprising layer thereon, the method comprising:

in a processing tool, physical vapor depositing a first layer comprising at least one of elemental aluminum or an aluminum alloy over a substrate in a first chamber, at least an outermost portion of the first layer being deposited at a first deposition temperature of at least 400°C;

~~after the first layer physical vapor depositing and~~ without letting the outermost portion of the first layer cool from the first deposition temperature to a temperature below 360°C, physical vapor depositing at least one of elemental titanium or a titanium alloy on the first layer in a second chamber of the processing tool while at least an outer portion of the first layer is at a temperature of at least about 360°C, and forming therefrom a second

layer comprising an alloy of titanium and the aluminum from the first layer in the second chamber during said depositing, the alloy having a higher melting point than that of the first layer, and wherein essentially all the physical vapor deposited titanium alloys with the aluminum of the first layer during the depositing;

physical vapor depositing a third layer comprising titanium nitride on the second layer;

removing the substrate from the processing tool after depositing the third layer; and

forming the first, second and third layers into a conductive line.

Claims 49-74 are cancelled.

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